

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application.

**Listing of Claims:**

Claims 1-13 (canceled)

Claim 14 (new): A method for modification of radiotherapy treatment delivery, the method comprising the steps of:

obtaining at least one treatment planning image from a patient to determine the relative location of target and sensitive structures;

preparing a treatment plan for the patient based on the at least one treatment planning image;

preparing a dose distribution plan for the patient based on the treatment plan;

obtaining at least one image from the patient at the time of treatment delivery to reposition the dose distribution for the patient, if necessary;

comparing the at least one treatment planning image to the at least one image taken of the patient at the time of treatment delivery to modify the treatment plan and dose distribution;

adjust patient position to better position patient's internal anatomy relative to dose distribution;

optimize repositioning of the patient so that the dose distribution matches planned dose distribution;

optimize positioning of the fraction image, relative to the dose distribution, such that the dose received by relevant structures for the fraction is improved;

iterate as necessary to best combine a treatment plan and a patient position to achieve the desired dose distribution; and  
deliver treatment to the patient.

Claim 15 (new): The method of claim 14, wherein the dose distribution is calculated directly for a fraction image, or obtained indirectly based upon the planning image dose distribution, possibly in conjunction with image registration.

Claim 16 (new): The method of claim 14, wherein the dose distribution is modified to take into account changes in patient position and/or changes in the patient's anatomy.

Claim 17 (new): The method of claim 14, wherein multiple objective functions can be used to achieve a precise treatment delivery.

Claim 18 (new): The method of claim 14, wherein objective functions and weightings can be adjusted to fine-tune treatment delivery.

Claim 19 (new): The method of claim 14, wherein objective function weights can be learned by the system based upon user training.

Claim 20 (new): The method of claim 14, wherein results can be utilized either by moving the patient, modifying the delivery, or some combination of the two.

Claim 21 (new): The method of claim 14, wherein contours can be generated by any available method, including but not limited to, manual contouring, automated contouring, deformable fusion, template-based automatic contouring, or a combination thereof.

Claim 22 (new): The method of claim 14, wherein multiple margin optimization can be used to pre-optimize multiple plans with different margins (e.g., tight, medium, loose), or with different objectives (e.g., aggressive treatment, sensitive structure sparing), wherein an appropriate plan can be selected each day from the optimized possibilities, based upon best estimates of the patient's anatomy that day.

Claim 23 (new): The method of claim 14, wherein contoured anatomy dose repositioning and multiple margin optimization with daily selection can function independently, but can also be used together.

Claim 24 (new): The method of claim 14, wherein contoured anatomy dose repositioning and multiple margin optimization with daily selection are not specific to a particular imaging modality or means of image acquisition, but can be applied to any form of obtaining more current patient positioning or anatomical information.

Claim 25 (new): The method of claim 14, wherein contoured anatomy dose repositioning and multiple margin optimization with daily selection can be applied using any available planning images, which includes both initially available images and related treatment plans, but also to plans created with any images obtained subsequent to initial planning (such as during the course of treatment).

Claim 26 (new): The method of claim 14, wherein process of plan selection in multiple margin optimization with daily selection, and the process of repositioning in contoured anatomy dose repositioning, can utilize information including but not limited to image information, contour information, dose-volume-histograms, and dosimetric information.